

Supplementary Figure 1: Currently available sheaths for CSP. (A) Medtronic C315His; (B) Medtronic C315S4; (C) Medtronic C315S5; (D) Biotronik Selectra sheaths; (E) Boston Scientific SSPC sheaths; (F) Medtronic C304His steerable sheath; (G) Abbott Agilis His Pro steerable sheath. Reproduced with permission from Medtronic, Biotronik, Boston Scientific and Abbott.

Supplementary Figure 2: Congenital coronary sinus anomalies for systemic LV anatomy. Panels A and B), an unroofed coronary sinus is shown during attempted coronary sinus (CS) lead placement for a patient with pacing induced cardiomyopathy. Note the connection between the distal coronary sinus and the morphologic left atrium, with potential for thromboembolic complication. In panels C and D) an occluded CS ostium related to prior patch placement at the time of intracardiac repair is demonstrated for a patient with common AV septal defect. Needle puncture into the CS with balloon angioplasty was required for catheter ablation targeting AV node re-entrant tachycardia.

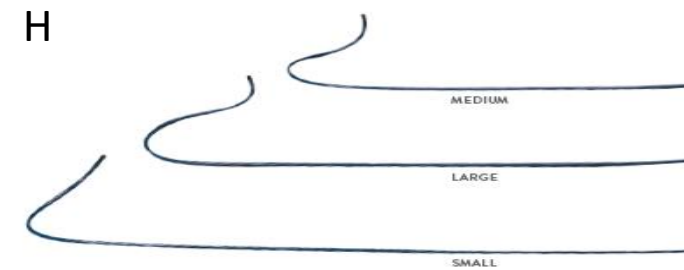
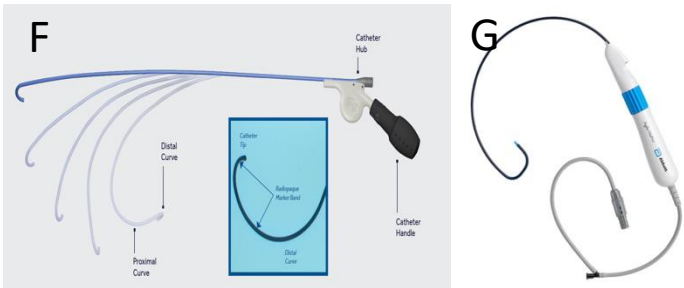
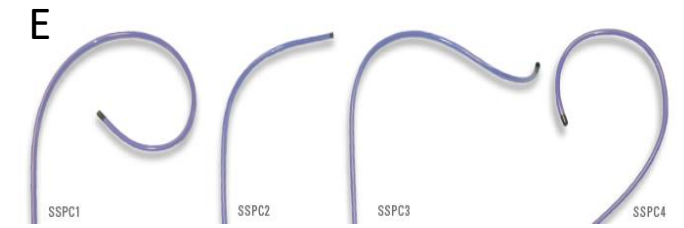
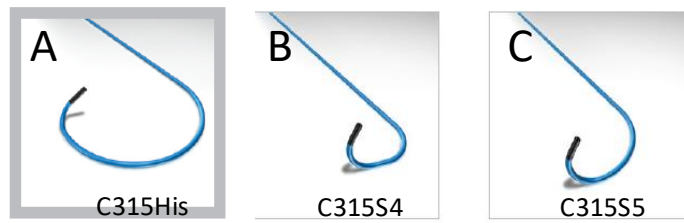
Supplementary Figure 3: CSP performed in a patient with ml-TGA, dextrocardia and a mechanical prosthetic valve in the systemic AV valve position. CSP was performed using electro anatomical mapping from the axillary access. Multielectrode high density mapping of the right atrium and sub pulmonary LV was performed with a multielectrode catheter to delineate the conduction system. A and B show the LAO and RAO views, respectively, with yellow tags depicting sites with His bundle recordings and brown tags LB/Purkinje potentials. The 3,830 lead was connected to the electroanatomic mapping system to guide lead implantation in the yellow tags as these were the sites with best electrical parameters. White dashed lines correspond to the mitral annulus. C) spontaneous rhythm showing a His bundle potential at the green tag; D) non-selective His bundle capture; E) selective His bundle capture; F and G: LAO and RAO projections, respectively, showing final lead position in the His bundle area.

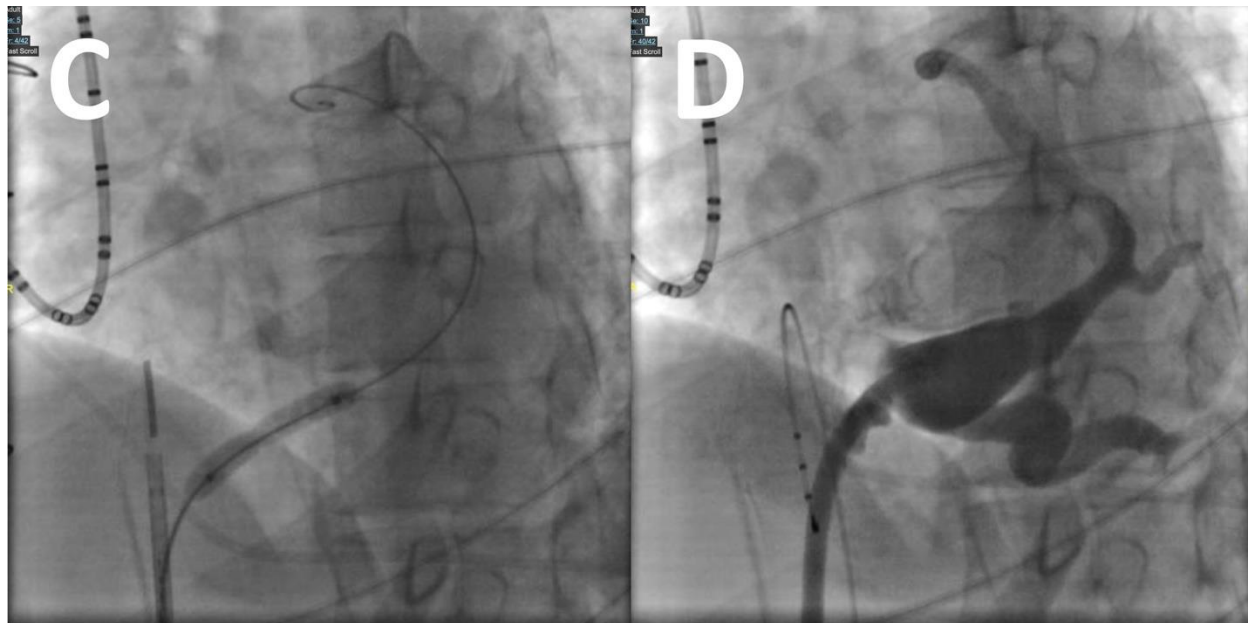
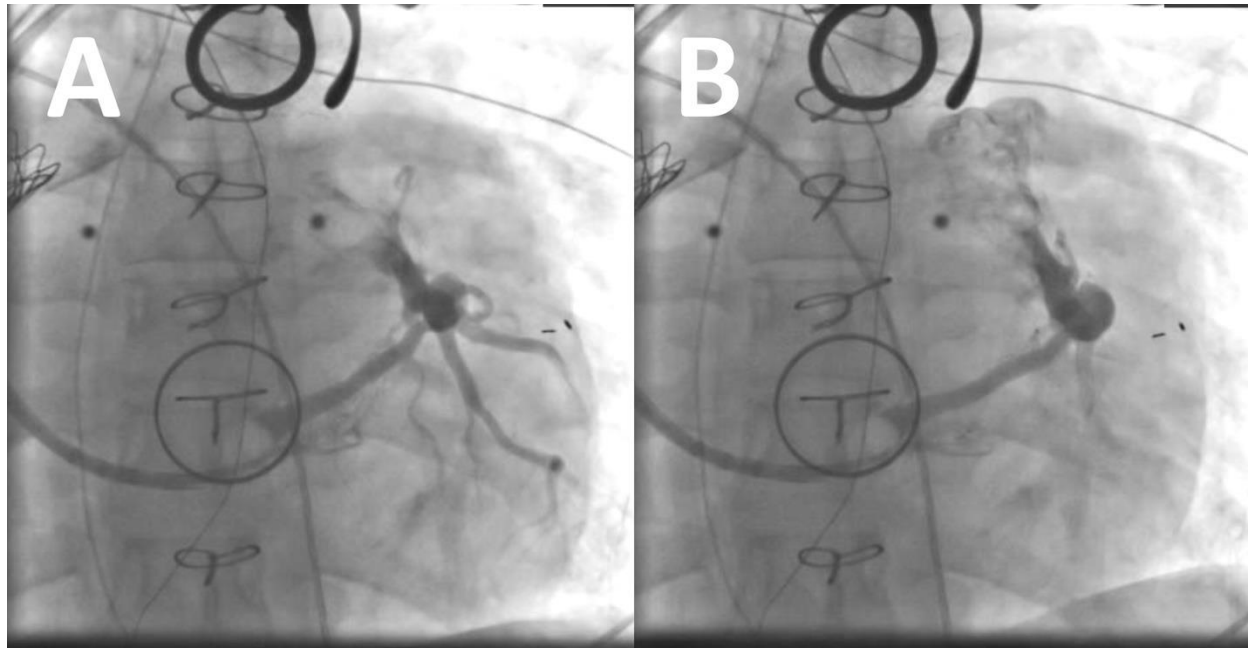
Supplementary Figure 4: A 30-year-old patient with repaired tetralogy of Fallot and paroxysmal episodes of 2:1 AV block. Panel A shows a RV ventriculography performed through the C315 sheath delineating the tricuspid annulus and the target area for LBBAP (outlined in orange); B) RAO projection of the final lead location; C) 12 lead-ECG during baseline sinus rhythm with first degree AV block and RBBB (QRS 182 ms); D) final paced 12-lead ECG during LBBAP (QRS 134 ms V6 R wave peak time 89 ms).

Supplementary Figure 5: A 26-year-old patient with tetralogy of Fallot who underwent complete repair (without ventriculotomy) developing post-surgical complete AV block. A conventional dual chamber pacemaker was implanted. The patient developed LV dysfunction during follow-up (LVEF 40%) and was scheduled for CSP. Complete AV block with narrow QRS scape rhythm was present and a dual lead technique was employed. A first 3,830 lead was placed in the His bundle area with selective His bundle capture and excellent electrical parameters. A second 3,830 lead was used to target the LBB area. Finally, both leads were kept in place and connected to a CRT-P generator pacing from the His bundle lead and using the LBBAP lead as a back-up lead. (A) 12 lead-ECG during spontaneous rhythm with both leads in place showing His bundle and left bundle/Purkinje potential; (B) pacing from the His bundle lead shows selective His bundle capture allowing the visualisation of the left bundle/Purkinje potential in the LBAP lead; (C) biventricular pacing (His bundle lead 20 ms before than LBBAP lead); (D) pacing from the LBBAP lead only; (E) and (F) LAO and RAO projections with final lead position.

Supplementary Figure 6: A 7-year-old patient with ml-TGA and paroxysmal AV block. Panel A shows a ventriculography of the subpulmonary LV in the RAO projection; panel B shows the position of the C315S4 sheath in the His bundle area; panel C shows the final lead position in the LBB area in the RAO projection with extra lead slack; panel D shows the final lead location in the LAO projection; panel E shows the baseline 12-lead ECG with first degree AV block and narrow QRS; panel F shows the final paced 12 lead-ECG during LBBAP.

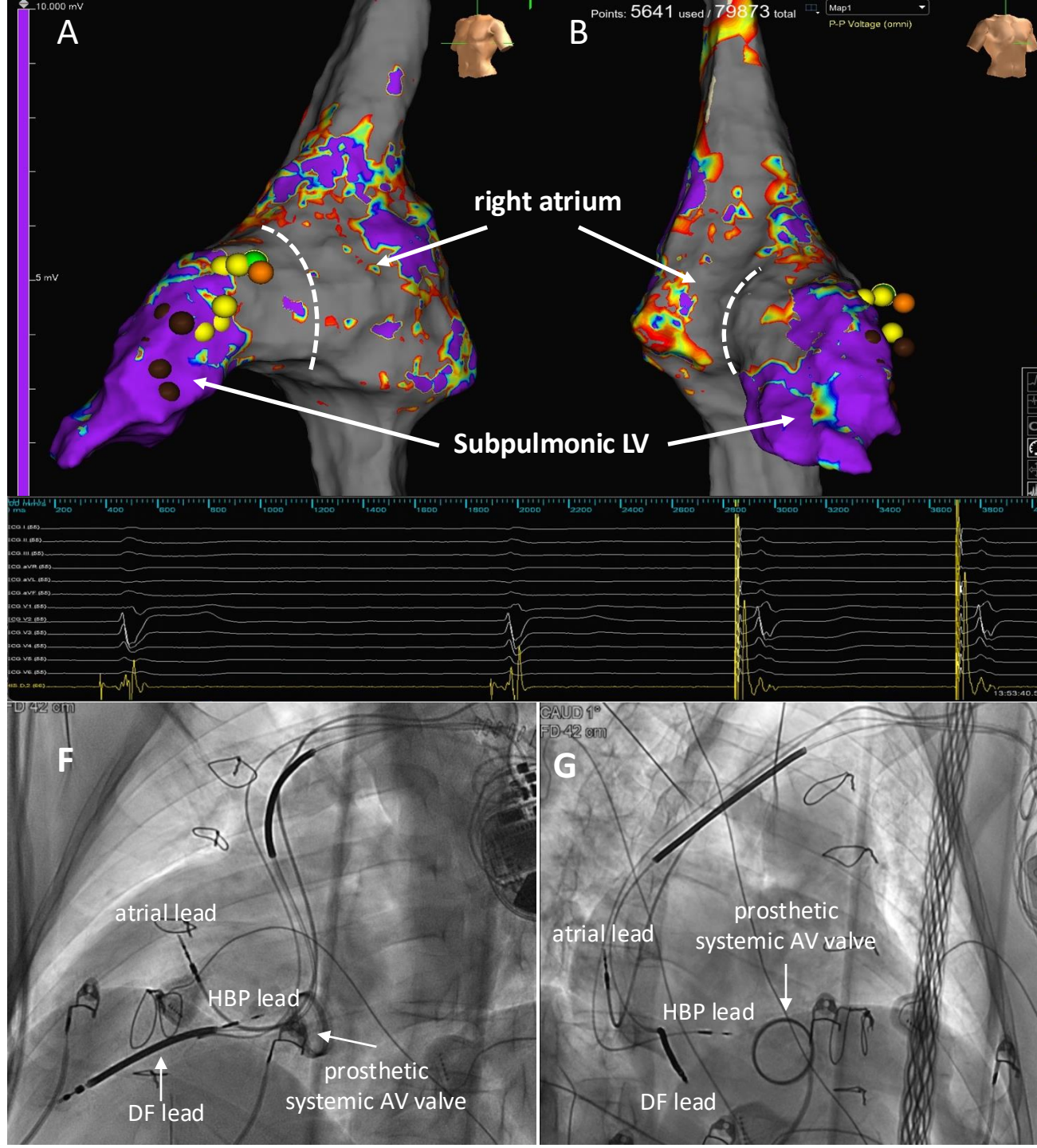
Supplementary Figure 1



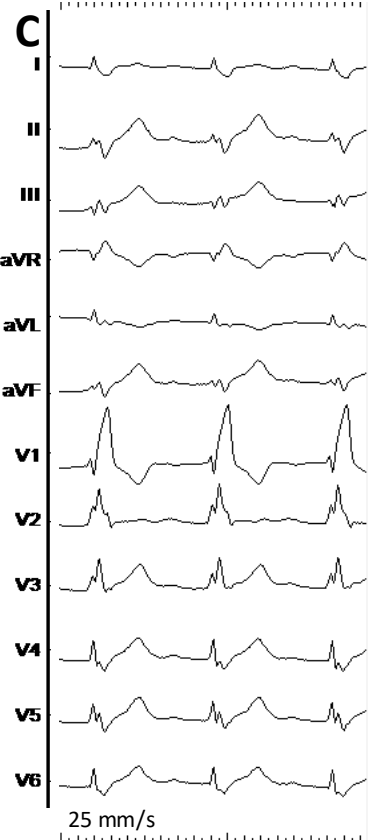
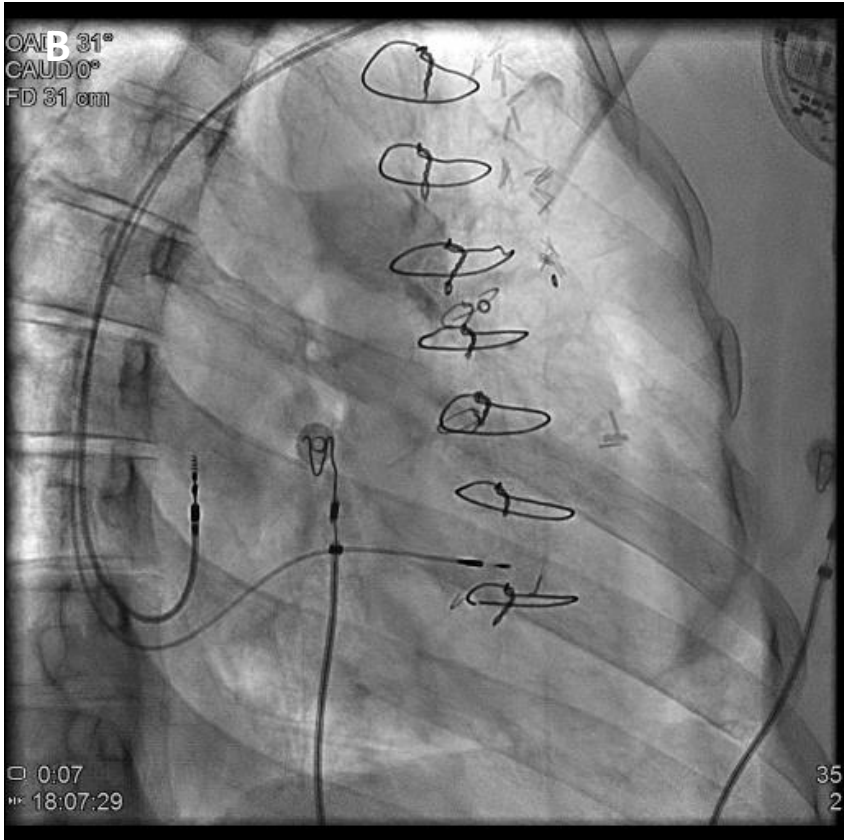
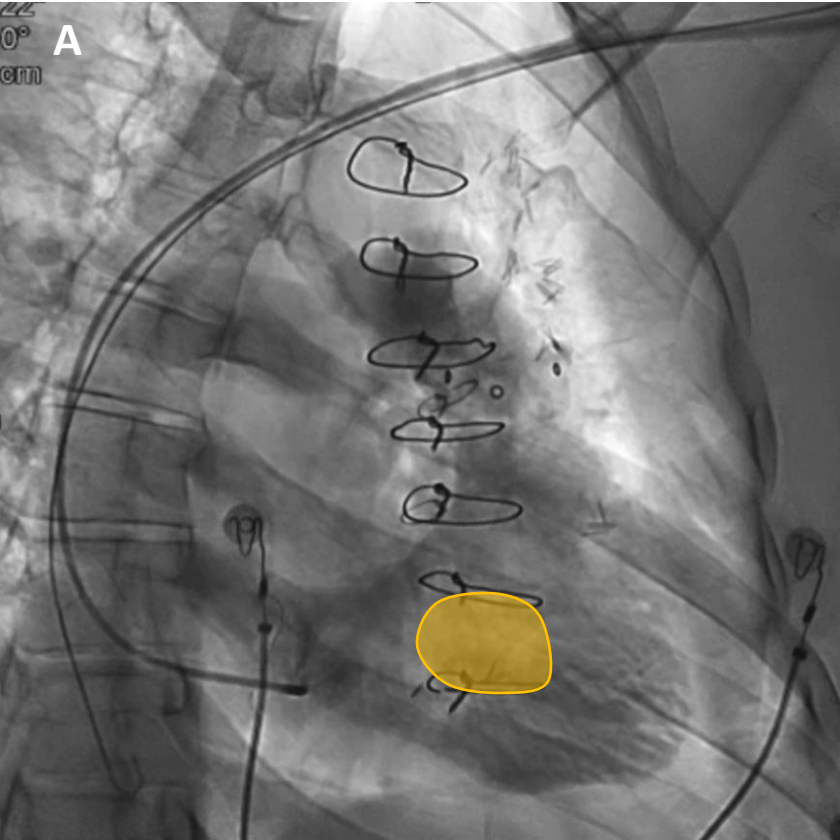


Supplementary Figure 2

Supplementary Figure 3



Supplementary Figure 4



Supplementary Figure 5

